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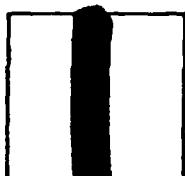
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COLLECTION OF COSTS FOR PLANNING AND PROSPECTING
STUDIES FOR CONSTRUCTION

PART II COSTS FOR THE FORMULATION OF PROJECT REQUIREMENTS
SECTION 7 PETROLEUM INDUSTRY



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STUDIES FOR CONSTRUCTION
PART II COSTS FOR THE FORMULATION OF PROJECT
REQUIREMENTS. SECTION 7 PETROLEUM INDUSTRY

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PREPARED BY:

TRANSLATION DIVISION
FOREIGN TECHNOLOGY DIVISION
WP-AFB, OHIO.

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U. S. BOARD ON GEOGRAPHIC NAMES TRANSLITERATION SYSTEM

Block	Italic	Transliteration	Block	Italic	Transliteration
А а	А а	A, a	Р р	Р р	R, r
Б б	Б б	B, b	С с	С с	S, s
В в	В в	V, v	Т т	Т т	T, t
Г г	Г г	G, g	У у	У у	U, u
Д д	Д д	D, d	Ф ф	Ф ф	F, f
Е е	Е е	Ye, ye; E, e*	Х х	Х х	Kh, kh
Ж ж	Ж ж	Zh, zh	Ц ц	Ц ц	Ts, ts
З з	З з	Z, z	Ч ч	Ч ч	Ch, ch
И и	И и	I, i	Ш ш	Ш ш	Sh, sh
Й й	Й й	Y, y	Щ щ	Щ щ	Shch, shch
К к	К к	K, k	Ь ъ	Ь ъ	"
Л л	Л л	L, l	Ы ы	Ы ы	Y, y
М м	М м	M, m	Ђ ъ	Ђ ъ	'
Н н	Н н	N, n	Э э	Э э	E, e
О о	О о	O, o	Ю ю	Ю ю	Yu, yu
П п	П п	P, p	Я я	Я я	Ya, ya

*ye initially, after vowels, and after ъ, ъ; e elsewhere.
When written as ё in Russian, transliterate as yё or ё.

RUSSIAN AND ENGLISH TRIGONOMETRIC FUNCTIONS

Russian	English	Russian	English	Russian	English
sin	sin	sh	sinh	arc sh	\sinh^{-1}
cos	cos	ch	cosh	arc ch	\cosh^{-1}
tg	tan	th	tanh	arc th	\tanh^{-1}
cotg	cot	cth	coth	arc cth	\coth^{-1}
sec	sec	sch	sech	arc sch	sech^{-1}
cosec	csc	csch	csch	arc csch	csch^{-1}

Russian English

rot	curl
lg	log

COLLECTION OF COSTS FOR PLANNING AND PROSPECTING STUDIES FOR CONSTRUCTION

Part II Costs for the Formulation of Project Requirements
Section 7 Petroleum Industry

Hints on the use of costs

1. In using this section of the collection it is necessary to be guided also by the instructions of the General part of the collection.
2. The collection of costs for planning and prospecting studies for construction, which includes this present section, goes into effect as of 1 January 1968, in connection with which as of 1 January 1968 the "Manual of Consolidated Cost Figures for Planning and Prospecting Studies", which was approved by Gosstroy of the USSR and put into effect as of 1 January 1958, the supplements to its parts, which were approved by the Gosstroy of the USSR in 1961, and the "Instructions on the Use of the Current Manual of Consolidated Cost Figures for Planning and Prospecting Studies", which was approved by the Gosstroy of the USSR in 1961, have been rescinded.

Costs for the Formulation of Project Requirements
Chapter 1 Oil Fields

1. Costs for the formulation of project requirements for the construction of oil fields and the various facilities of the oil

extraction industry are given in this chapter of the collection.

2. The costs in Tables 7-1 and 7-2 do not take into account the planning of:

oil and gas wells;
shafts for the extraction of oil;
equipment for the dehydration, desalinization, and stabilization of oil;
equipment for stripping and scrubbing of gas;
gas-compressor stations;
general oil field water supplies and water lines;
sewage systems and purification facilities;
electrical substations and electrical transmission lines of 35kV and higher;
petroleum product pipelines beyond the boundary of the oil deposit contours;
contour and perimeter flooding facilities.

3. In the formulation of plans for regions submerged in deep water, territory heavily covered with forests or swamps, and arid deserts, apply a factor of 1.15 to the costs in Tables 7-1 and 7.2.

Oil Fields

Table 7-1

	Number of wells	Unit of Measure	Values in rubles	
			a	b
1	up to 80	1 well	3930	59.2
2	81 to 175	"	4340	53.6
3	176 & over	"	10840	16.6

Notes: 1. In formulating plans for a deposit consisting of several fields, the cost of planning is defined as the sum of costs per field added to cost of planning interfield facilities.

2. In formulating project requirements for exploratory recovery of a deposit use the costs of this table with a factor of up to 0.5.

3. When there are two or more grades of oil or separate accumulations of waterless and flooded oil, as well as when there are congealed and paraffin-based oils, apply a factor of 1.05 to the costs in the table.

4. When determining the cost of formulating project requirements of an oil field for a deposit for which a general plan for the deposit as a whole has been developed, the cost of developing the general plan is excluded from the cost per oil field.

General Plan for an Oil Deposit or a Group of Oil Deposits

Table 7-1a

The size of the territory of the deposit or the overall area of a group of deposits		Unit of measure	Values in rubles	
1	Up to 5000 hectare	1000ha	---	1484
2	6000 to 10000 hectare	" "	1620	1160
3	11000 to 25000 "	" "	7280	580
4	26000 hectare and over	" "	19330	98

Note: When determining the cost of developing a general organizational plan for an oil deposit on which active fields are located, the area of these oil fields are excluded from the area of the deposit.

The Conversion of Gusher or Mechanical Operation of a Well to Natural (Compressor-less) Gas Lift

Table 7-2

Number of wells	Unit of measure	Values in rubles	
		a	b
1	Up to 50	1 well	1049.95
2	51 and over	"	1716.44

Note: In converting gusher or mechanical operation of a well to compressor gas lift, the cost of planning compressor stations is added to the cost of planning the facility.

Chapter 2 Oil and Gas Wells

The table gives the costs for the formulation of a single-step plan for structural (exploratory) wells in new areas which are being prepared for exploitation.

Table 7-3

	(a) Нефтяные и газовые скважины	(b) Единица измерения	(c) Значение показателей в руб.							
			(d) одноколонная конструкция (трубопровод, эксплуатационная колонна)		(e) дву- и трехколонная конструкция скважин (одна-две технические колонны, эксплуатационная колонна)		(f) четырех- и пятиколонная конструкция скважин (три-четыре технические колонны, эксплуатационная колонна)		(g) шесть и более колонн (пять и более технических колонн, эксплуатационная колонна)	
			a	b	a	b	a	b	a	b
1	2	3	4	5	6	7	8	9	10	11
1	Глубиной до 2500 м (h)	(i) 1 м	65,7	0,033	70,08	0,04	96,36	0,04	87,6	0,054
2	от 2501 до 4000 м	(k) то же	120,89	0,011	113,88	0,024	122,64	0,029	183,96	0,018
3	Глубиной от 4001 и более (m)	>	8,76	0,044	35,04	0,044	61,32	0,044	43,8	0,053

Key: (a) oil and gas wells; (b) unit of measure; (c) values in rubles; (d) single-column structure (oil pipe, oil string); (e) two- and three-column structures of wells (one-two engineering columns, an oil string); (f) four-five column well structures (three-four engineering columns, an oil string); (g) six or more columns (five or more engineering columns, an oil string); (h) with a depth of up to 2500m; (i) 1 meter; (j) with a depth of from 2501m to 4000m; (k) ditto; (m) with a depth of 4001 and over.

Notes: 1. In formulating a plan for the construction of operational wells apply a factor of 0.85 to the costs in the table.

2. The cost of designing grouped and slanted wells is determined by the cost for one well with a factor of 1.1.

3. In formulating a plan for a group of wells, the cost of planning is determined for the first well with a factor of 1 and for each successive well with a factor of 0.5.

4. When it is necessary to plan wells in water for deep drilled oil and gas wells, use the rates for wells with a depth of 1200m with a factor of 0.8.

5. When there is a requirement to make calculations for engineering columns for buckling and internal pressure for wells with a depth over 2500m, apply the following factors to the costs in table:

a) when calculating one engineering column - 1.1;

b) when calculating two or more engineering columns - 1.2.

Chapter 3 Other Facilities for Collecting Oil and Gas which are Planned outside the Complex

Table 7-4

Name of Item	Unit of measure	Values in rubles	
		a	b
1 Oil collecting containers of all purposes	1m ³	123.6	0.05
Reservoir parks for crude and commercial oil by overall volume in m ³ :			
2 up to 30,000	"	288.4	0.012
3 from 30,001 to 40,000	"	65.92	0.019
4 40,001 and over	"	527.36	0.007
Distribution of active agents (air, gas) per area in ha:			
5 up to 1000	1ha	255.44	0.16
6 1001 and over	"	329.6	0.09
7 Distribution stations for active agents (gas, air), gas-distributing and gas-measuring points	1 station 1 point	140.08	--
8 Intrafield oil pumping stations with electric motor driven pumps of different quantities and power	1 pumping station	247.2	--
Booster pumping stations with output in tons/day:			
9 up to 8000	1 ton/day	486.16	0.056
10 from 8001 to 15,000	" "	906.4	0.23
11 15,001 and over	" "	2298.96	0.017

Notes: 1. When there are two or more grades of oil or separate accumulations of water-free and flooded oil and when there are congealed and paraffin-based oils apply a factor of 1.05 to the costs in the table.

2. In planning intrafield oil pumping stations with pumps driven by internal combustion engines apply a factor of 1.2 to the costs in item 8 in the table.

Chapter 4 Facilities for Field Preparation of Oil

Table 7-5

Name of item	Unit of measure	Values in rubles	
		a	b
Facilities for thermochemical dehydration of oil in a single-step process with output in thous. tons/yr of commercial oil:			
1 up to 1000	thous. tons/yr	1412.12	1.4
2 from 1001 to 2000	"	2101.76	0.71
3 2001 and over	"	2257.75	0.63
Facilities for dehydration and desalination of oil with output in thous. tons/yr of commercial oil:			
4 up to 1000	"	2807.82	4.93
5 from 1001 to 2000	"	3875.12	3.86
6 from 2001 to 3000	"	4564.76	3.86
7 3001 and over	"	9835.58	1.76
Facilities for dehydration and desalination of oil (industrial unit without subsidiary or auxiliary facilities) with output in thous. tons/yr of commercial oil:			
8 up to 8000	"	1124.77	3.79
9 from 1001 to 3000	"	2477.21	2.45
10 3001 and over	"	6305.28	1.17
Facilities for dehydration and stabilization of oil (separation) with output in thous. tons/yr of commercial oil:			
11 up to 1000	"	3448.2	5.34
12 from 1001 to 2000	"	4917.79	3.87
13 from 2001 to 3000	"	5623.85	3.51
14 3001 and over	"	9154.15	2.34
Facilities for dehydration and stabilization of oil (industrial unit without subsidiary or auxiliary facilities) with output in thous. tons/yr. of commercial oil:			
15 up to 1000	"	1756.94	4.22
16 from 1001 to 3000	"	3341.47	2.64
17 3001 and over	"	6362.75	1.63

Table 7-5 (continued)

	Facilities for comprehensive preparation of oil with output in thous. tons/yr. of commercial oil:				
18	up to 1000	thous. tons/yr	5270.82	5.75	
19	from 1001 to 3000	"	7610.67	4.02	
20	3001 and over	"	12914.33	2.3	
	Facilities for comprehensive preparation of oil (industrial unit without subsidiary or auxiliary facilities) with output in thous. tons/yr. of commercial oil:				
21	up to 1000	"	2454.79	4.93	
22	from 1001 to 3000	"	4408.77	2.98	
23	3001 and over	"	8423.46	1.64	
	Field units for separation of oil (end trap facilities) with output in tons/day:				
24	up to 8000	1 ton/day	328.4	0.039	
25	8001 and over	"	451.55	0.023	

Notes: 1. The costs in Table 7-5, items 1 - 23 are not taken into consideration in planning: final separation facilities, multiple water-pumping lines and waterlines for pumping waste water into productive horizons, and facilities for transporting vapor condensate.

2. In planning facilities involving two-stage dehydration or desalination processes, apply a factor of 1.1 to the costs in the table.

Chapter 5 Other Structure for Offshore Oil Fields

Table 7-6

	Name of structure	Unit of measure	Values in rubles	
			a	b
A. Off-shore causeways with passing and turnaround areas				
1	For a water depth of up to 10m.	1000m	1017.15	--
2	" " "	11 to 20m.	1458.34	--
3	" " "	21 to 27m.	1841.38	--
4	" " "	28 to 35m.	2233.66	--
5	" " "	over 35m.	2713.62	--
B. Off-shore operating platforms for drilling at sea (type adjoining causeway or the island type)				
6	For a water depth of up to 10m.	one struct- ure	1297.74	--
7	" " "	11 to 20m.	1947.53	--

Table 7-6 (continued)

8	For a water depth of 21 to 30m.	one struct- ure	2034.29	--
9	" " "	31 to 40m.	"	2159.82
10	" " "	41 to 50m.	"	2394.26
11	" " "	over 50m.	"	4476.55

C. Pipelines

12	Intrafield pipelines laid along the seafloor with no inlets to them, D>150mm & length up to 16km.	one pipe- line	987.61	--
13	Main underwater pipeline at a sea depth of up to 20m and with a length of up to 20km	"	1986.3	--

Notes: 1. The costs for planning platforms with causeways or island type foundations for well drilling and exploitation of off-shore oil wells include the cost of planning platforms on which 3 to 4 derricks are located for drilling wells to a drill depth of up to 3000m.

2. The cost of planning platforms with less than 3 drilling derricks and with a drill depth of up to 3000m, apply a factor of 0.9 to the costs in the table.

3. In planning platforms with more than 4 derricks and with a drilling depth of up to 3000m, apply a factor of 1.1 to the costs in the table for every two additional drilling derricks.

4. In planning drilling platforms for drilling to a depth of 3000m, apply a factor of 1.15 to the costs in the table for each 1000m drilled beyond the depth of 3000m.

5. The cost of planning drilling platforms with over 4 derricks and with a drill depth over 3000m is determined by applying the product of the appropriate factors to the costs in the table.

6. In determining the cost of planning causeway branch-off areas in case of planning them outside the complex, apply a factor of 0.3 to the costs in items 6 through 11 of this table.

7. Determine the cost of planning foundations under oilfield structures (oil collection points, parks for commercial reservoirs, water purification equipment, etc.) according to the cost of planning drilling platforms (of equal area) with a factor of 0.9.

8. The cost of planning off-shore oil fields and their associated facilities is determined by the cost of planning corresponding facilities on land and adding the cost of planning the foundations under these facilities according to Table 7-6.

9. The cost of planning structures is assumed for medium soil conditions. In planning in complex soil conditions, apply a factor of 1.3 to the costs in the table.

10. The costs in the table allow for planning structures of metal or reinforced concrete.

Other Structural Elements of Off-shore Oil Field Facilities

Table 7-7

	Name and characteristics of structural elements	Unit of Measure	Values in rubles	
			a	b
1	Vehicular traffic portion of causeway (highway, automobile pull-off place, platform for branching off):	one type	156.91	--
	a) wood		193.83	--
2	Deck of platforms (platforms for well drilling, pumping stations, water purification equipment, reservoir parks, oil collection points, moorings, etc.):	"	119.99	--
	a) wood		147.68	--
3	Precast reinforced concrete slab for a causeway or a platform:	"	27.69	--
	a) up to 1 m ³		36.92	--
4	Metal girder beam of a span	"	221.52	--
	a) with a continuous span of:		304.59	--
	up to 15m	"	387.66	--
	16 to 30m	"	461.5	--
	31 to 50m	"	230.75	--
	over 50m	"	323.05	--
	b) lattice girder with a span of:	"	424.58	--
	up to 15m		507.65	--
5	Metal piling causeway support (flat) at a sea depth of:	"	489.19	--
	a) up to 15m		738.4	--
6	Floors ("flexible" and "rigid") made of piles at a mooring stress of:	"	73.84	--
	a) up to 20 tons		83.07	--
	b) 21 to 50 tons	"	92.3	--
7	Observation facilities, walkways under platforms, foot bridges, etc.	"	110.76	--
	Derrick foundations for wells drilled off-shore at a drilling depth of:		230.75	--
	a) up to 3000m	"		

9	Metal support modules for a sea depth of:	one type	323.05	--
	a) up to 10m	"	323.05	--
	b) 10.1 to 20m	"	369.2	--
	c) 20.1 to 30m	"	507.65	--
	d) 30.1 to 40m	"	738.4	--
	e) 40.1 to 50m	"	1015.3	--
	f) over 50m	"	1199.9	--
10	upper section of steel prefabricated modules with dimensions on a plane of 8X16, 8X20, 10X20m	"	323.05	--
11	Steel intermediate sections with a span of:	one sect- ion	175.37	--
	a) up to 10m	"	230.75	--
	b) over 10m	"		
12	Facility for embarkation and disembarkation of people without cushioning devices at a structural height above water level of:	one plat- form	230.75	--
	a) up to 8m	"	276.9	--
	b) over 8m	"		
13	Berthing and mooring facility of a welded steel construction for a sea depth of up to 12m	one com- plex	184.6	--
14	Foot bridge of steel with span of:	one bridge	156.91	--
	a) up to 20m	"	184.6	--
	b) 21 to 35m	"	323.05	--
15	Single column electrical transmission tower off-shore with a height of:	one type	46.15	--
	a) up to 20m	"	56.38	--
16	Anchor towers, dead-end towers, and angle-suspension towers with a height of:	"	46.15	--
	a) up to 20m	"	83.07	--
17	Winch towers with a height of:	"	110.76	--
	a) up to 50m	"	138.45	--
18	Anchor type intermediate and return towers with a height of:	"	138.45	--
	a) up to 40m	"		

	b) over 40m	one type	156.91	--
19	Pile foundation of towers:			
	a) under intermediate towers with a height of:			
	up to 30m	"	36.92	--
	over 30m	"	36.92	--
	b) under special anchor towers with a height of:			
	up to 30m	"	55.38	--
	over 30m	"	64.61	--
20	Space lattice towers:			
	a) intermediate type with a height of:			
	up to 50m	"	92.3	--
	51 to 70m	"	147.68	--
	over 70m	"	184.6	--
	b) anchor type with a height of:			
	up to 50m	"	166.14	--
	51 to 70m	"	239.98	--
	over 70m	"	313.82	--
21	Foundations under special towers made of modules for a sea depth of:			
	a) up to 15m	"	369.2	--
	b) 15.1 to 25m	"	461.5	--
	c) over 25m	"	553.8	--

Note: The costs given in the table are used for formulations involving standard structural elements by a standard design plan.

Relative Cost of Individual Section of Project Requirements of Oil Fields

For Table 7-1

Name of Plan Section	Percent of table cost
Drilling	23
Gas and Oil Extraction	3.4
Gas and Oil Collection	31
Mechanical repair depots	28.5
Automotive depots	10.4
Heat supply (sources and systems)	3.7
Total	100.0

Relative Cost of Individual Parts of Project Requirement Sections
of Oil Fields

For Table 7-1

Name of Parts of Plan Section	Percent of Cost of Planning of Section			
	(a)	(b)	(c)	(d)
1	2	3	4	5
Site Selection	--	11	2	--
Technical and Economic part	8	8	6	--
Engineering part	40	30	46	--
Automation and tele-automation	12	--	--	--
Electrical supply	7	12	5	10
Communications and signaling	1.5	2	2	--
Architectural and construction part ..	8	13	22	22
Heating and ventilation	4.5	4	4	3
Water supply and sewage	6	5	4	3
Supplying heat	--	3	3	60
General Plan	1.5	8	2	--
Management of construction	1.5	2	2	--
Corrosion protection	2	--	--	--
Budgetary part	8	2	2	2
Total	100	100	100	100

Key: (a) gas and oil collection; (b) mechanical repair depots;
(c) automotive depots; (d) supplying heat.

Relative Cost of Individual Parts of Project Requirements for
Converting Gusher and Mechanical Operation of Wells to Natural
(Compressor-less) Gas Lift

For Table 7-2

Name of Plan Parts	% of table cost
Technical and economic part ..	11
Engineering part	46
Automation and tele-automation	11
Architectural and structural .	4
Heating and ventilation	2
Electrical supply	4
Communications and signaling .	2
Supplying heat	3
Water supply and sewage	2
General Plan	2
Management of construction ...	9
Budgetary part	4
Total	100

Relative Cost of Individual Parts of Engineering Plan for Oil and Gas Well Facilities

For Table 7-3

Name of Parts of Plan	Percent of Table Cost
Engineering Part	54
Geological Part	14
Budgetary Part	32
Total	100

Relative Cost of Individual Parts of Project Requirements of Specific Items in Collection of Oil and Gas which are Planned Outside the Complex

For Table 7-4

Name of Parts of Plan	Percent of Table Cost					
	Item 1	Items 2-4	Items 5-6	Item 7	Item 8	Items 9-11
Site Selection	--	2	--	--	2	2
Technical and Economic Part .	3	8	12	13	9	6
Engineering Part	40	30	48	48	35	32
Automation & tele-automation	10	13	2	--	9	8
Architectural & construction	8	8	8	9	10	10
Heating and ventilation	4.5	5	4	4	4	7
Electrical supply	7	7	5	5	6	8
Communications & signaling .	--	1	2	2	1	2
Supplying heat	5	5	4	5	4.5	5
Water supply and sewage	10	9	7	7	6	6
General Plan	1.5	1.5	--	--	1.5	1.5
Corrosion Protection	1	1	1	--	1	1
Management of Construction .	2.5	2.5	3	3	3	3
Budgetary Part	8	7	4	4	8	8.5
Total	100	100	100	100	100	100

Relative cost of Individual Parts of Project Requirements for Equipment for Field Preparation of Oil

For Table 7-5

Name of Parts of Plan	Percent of Table Cost		
	Items 1-3	Items 4-23	Items 24-25
Site Selection	4	3.5	1
Technical and economic part ...	8	8	9
Automation & tele-automation ..	8	7	8
Engineering Part	34	39	45
Architectural & construction ..	9	9	9

Ventilation and heating	4	4.5	5
Electrical supply	5	5	5
Communications & signaling	2	1.5	--
Supplying heat	4	4	2
Water supply and sewage	8	6	6
General Plan	2	2	1.5
Roads and Transportation	--	1.5	--
Corrosion Protection	1	1	1
Management of Construction	2	1	1.5
Budgetary Part	9	7	7
 Total	100	100	100

Relative Cost of Individual Parts of Project Requirement for
Off-shore Oil Field Facilities

For Table 7-6

Name of Parts of Plan	Percent of Table Cost		
	Items 1-5	Items 6-11	Items 12-13
Technical and economic part ...	4	4	5
Engineering Part	--	4	80
Construction Part	73	66	--
Electrical Supply	2.5	7.5	--
Communications & signaling	--	1.5	--
Water supply and sewage	3	2	--
Corrosion Protection	2.5	2	--
Management of Construction	10	9	10
Budgetary Part	5	5	5
 Total	100	100	100

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C535 AVIATION SYS COMD	1	CCN	1
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D008 NISC	1	NIIS	2
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P005 DOE	1		
P050 CIA/CRB/ADD/SD	2		
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NASA/NST-44	1		
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L.L/Code L-389	1		
NSA/1213/TDL	2		